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## Manpower Development: Industry and Educators Need to Work Together

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Peter W. Sauer, Mariesa Crow, and Mani Venkata

# manpower development

## *industry and educators need to work together*

**P**EOPLE ARE NORMALLY THE largest expense for companies and often the first to go when things get tight. They are also the lifeblood of many companies, containing valuable corporate knowledge that cannot be easily recovered after a personnel crash.

The changes in the electricity industry have created a major reshuffling of people and their talents. In many cases, those with the right talents have survived and even advanced as a result of the upheaval. In many other cases, people have sought new careers outside the electricity industry. New electrical engineers are confronted

with difficult decisions in the face of unprecedented uncertainty. This special section was created to draw attention to the need for the electric power industry and the electric power educators to help current and future engineers cope with the new demands of a competitive global environment.

On the education side, two leaders in the U.S. National Academy of Engineering have offered their view of manpower issues. To begin, Wulf and Fisher say that "Today's engineering schools are not preparing their graduates as well as they might for useful practice in the 21st century." They claim two fundamental problems:

- ✓ Fewer students are attracted to engineering schools, and too many drop out.
- ✓ Engineering schools are increasingly out of touch with the practice of engineering.

These problems are said to create graduates who are ill-equipped for the complex interactions (across many disciplines) of real-world engineering systems. The charge goes so far as to assert that "students are being prepared to practice engineering for their parents' era, not for the 21st century."

The solution proposed by Wulf and Fisher is a major shift in engineering education's "center of gravity." They state that the last major shift in this center of gravity occurred about 50 years ago when universities aggressively adopted the "engineering science" model, emphasizing the scientific and mathematical foundations of engineering rather than the traditional empirical design methods based on experience and practice. Their hypothesis is that something in this "engineering science" model probably needs to be changed to keep pace with the above driving forces. The authors state that today's student engineers not only need to acquire the skills of their predecessors, but also:

- ✓ cultivate an appreciation of human dimensions of technology
- ✓ have a grasp of the significance of global issues
- ✓ be sensitive to cultural diversity
- ✓ know how to communicate effectively.



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Wulf and Fisher list six basic areas where reform is needed and provide specific steps that might be taken to affect the proper change to better prepare engineering students.

Gosbell and Robinson, in their recent article "Assessing the Future of Electrical Power Engineering," focus primarily on electrical power engineering and the manpower issues in Australia. While this report focuses solely on the needs of Australia, it is very extensive and includes numerous issues that are likely to be common to power engineering manpower needs throughout the world. The executive summary indicates the following problems:

- ✓ The number of power engineering academics is decreasing, and the average age is 50 years old.
- ✓ International students make up 50% of those taking power courses.
- ✓ High school students have less interest in undergraduate courses in all areas of technology.
- ✓ Experienced engineers have insufficient time to mentor recent graduates or recruits.
- ✓ There are increased demands on undergraduate coursework for a more generalist approach. This has caused a reduction in power course offerings.

The report presents an action plan that includes the following highlights:

- ✓ Industry should provide funding to allow expert academics and industry practitioners to work together in course development.
- ✓ Schools should encourage new academics to work closely with industry.
- ✓ High school students should be informed of the stimulating careers that can come in power engineering.
- ✓ Industry should help encourage students to undertake power engineering.

There appears to be a number of similarities between the findings and recommendations of this report and those of Wulf and Fisher. Between the two

reports, there is considerable material for thought and discussion.

In this special section, we offer five additional views on the manpower issues in power engineering.

Candee Chambers, an American Electric Power (AEP) recruiter, was interviewed and a report of this interview appears in question/answer format. Sample questions asked of Chambers include: what is the average age of employees, and what are the expected hiring needs of AEP? What should new engineers know? What kind of training and continuing education does AEP offer? How does AEP interact with universities

to help promote power engineering? What advice would you give universities to better prepare their graduates? What advice would you give companies looking to hire power engineering graduates?

In the next article, Mariesa Crow provides suggestions for interaction between academia and industry to improve company recruiting, such as establishing a presence on campus.

A company can attempt to establish a presence on campus by talking to students in power classes or local professional society meetings, or by sponsoring field trips to facilities. A third way to establish such presence is to actually become involved in senior design projects. At the administrative level, universities like to have industry engineers serve on their advisory boards; this is a great opportunity to create a presence on campus. Funding research for graduate students is an activity that promotes interaction and shows industrial support for power programs. Crow's article also offers concrete suggestions for improving recruiting success and creating a one-stop shopping environment.

Géza Joós discusses the problem of training the next generation of power engineers and researchers. He presents several concerns and solutions proposed or adopted by academia and industry at a workshop held in October 2003 at Hydro-Quebec. His article presents an assessment of the situation and describes an action plan with solutions. The issues addressed include: manpower needs, knowledge management, utility support of universities, a utility partnership with universities, an assessment of the engineering training trends and needs, industry support for training

researchers, and the role of government in providing funds for industry/collaborative work.

In another article, Ross Schifo focuses on factors that influence long-term success in ensuring that the future demand for power engineers will be met. Such factors include: articulating a compelling mission, developing a comprehensive strategy, executing supporting tactics, and

demonstrating leadership. This also means answering the questions: What is the power industry about? And, how is this message being communicated? How is this message being reinforced? The article talks about the role that PES might play in this challenge. It also discusses several ideas that have been proposed in the past, and emphasizes the need for leadership to take aggressive action.

Anil Pahwa and his colleagues discuss distance learning and the issues of student learning, pedagogy, delivery media, logistics, and cost. Their article includes the results of a survey

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of our other work locations, including substations and construction sites. Our new-hire engineers go through our regular new-hire training as well as on-the-job training with a mentor who oversees their work and is available to answer questions and provide direction when needed.

**PEM:** *What kind of continuing education does AEP promote for its engineers?*

**CJC:** We offer educational assistance, which amounts to 75% of the cost of registration, tuition, and laboratory fees and 100% for books involved for any approved course of study up to an annual limit of US\$5,250. For employees who obtain college degrees, the company will pay an additional 25% of the cost of all covered expenses, not to exceed our annual limit of US\$5,250, leading to the degree, if employment is continued for at least three years after receiving the degree. The final tuition assistance amounts to 100% after the three-year waiting period is met.

**PEM:** *How does AEP interact with universities to help promote power engineering?*

**CJC:** We are happy to serve in any advisory role to demonstrate our need for power engineering curriculums. Var-

ious experienced engineers in our company already serve as liaisons with various schools, usually the schools from which they have graduated.

**PEM:** *What advice would you give universities to better prepare their graduates?*

**CJC:** I would honestly recommend that they partner with various employers wherever possible and invite employers to come on campus for speaking engagements, presentations, etc. All of my co-ops have said that they learn so much when they are working, and they have also said that their

experience “on-the-job” serves them well when they are back at school. So many times, they learn things in the classroom, but they also need to learn how things really work back at the workplace. We try to get our co-ops involved in the whole project they are working on, including the

budget side. All of our projects are tied to the budget approval process, and that’s a very important part for our students to see so they can understand the entire project design process—from start to finish.

**PEM:** *What advice would you give new graduates looking for a job in the power industry?*


**CJC:** I would tell any student that

co-op experience is crucial. Even if the experience is with another company, we always look positively on experience a student has gained with a company in the field they are studying. We have found that retention of our co-ops exceeds normal retention statistics.

**PEM:** *What advice would you give companies looking to hire power engineering graduates?*

**CJC:** I would recommend that companies select a few schools that they are most interested in, talk to their career services offices, and find out how they can get more involved. Maybe it’s through participation in the school’s curriculum discussions or perhaps it’s through meetings with various faculty members, but they should definitely target a select group of schools where the power programs are consistent with the company needs, and they should focus their energy on those schools. It’s best to try and develop a partnership with a few schools where their name is recognized by the students at career fairs and the professors can make recommendations to the students because they are more knowledgeable about the true needs of the companies. It’s a win-win situation for both...the schools reap the benefits from company donations, and the companies reap the benefits from well-prepared students who are anxious to work for them!

**PEM:** *Any other comments?*

**CJC:** Thanks for the opportunity to participate in this discussion! 

Our partnerships with various university programs have been invaluable to us.

## guest editorial

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conducted to determine distance-learning resources in power systems as well as a brief history of distance learning in power systems at Kansas State University. While the survey included responses from 27 universities, only 13 reported activities in the electric power engineering area. The historical section includes a comparison of delivery methods and

provides a discussion of Internet issues and problems.

### Further Reading

W.A. Wulf and G.M.C. Fisher, “A makeover for engineering education,” *Issues Sci. Technol.*, vol. 18, no. 3, Spring 2002.

V. Gosbell and D. Robinson, “Assessing the future of electrical

power engineering,” Institute of Engineers, Australia, 2004 [Online]. Available: <http://www.ieaust.org.au/policy/publications.html>

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